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EXAMINER	
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2633	

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Please find below and/or attached an Office communication concerning this application or proceeding.

SM

Office Action Summary	Application No. 10/054,581	Applicant(s) ROCKWELL ET AL.
	Examiner Christina Y. Leung	Art Unit 2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 21 March 2005.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,7,9-15 and 22-28 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,7,9-15 and 22-28 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 12, 13, 22, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs et al. (US 4,873,681 A) in view of Blackburn et al. (US 4,164,650 A).

Regarding claim 1, Arthurs et al. disclose a router circuit (Figure 3) having a plurality of electrical input signals (labeled "data streams" in Figure 3) comprising:

an electrical-to-optical converter (transmitters 45-1...N) for changing the plurality of electrical input signals into a plurality of optical input signals, the electrical-to-optical converter comprising a modulated tunable laser having a programmed wavelength (column 3, lines 54-59);

a mixing circuit (N x N star coupler 22) coupled to the electrical-to-optical converter, the mixing circuit generating a plurality of substantially identical composite signals corresponding to the plurality of optical inputs, the composite signals comprising at least a portion of each of the plurality of optical signals;

an optical-to-electrical converter (fixed wavelength receivers 61-1...N) comprising a plurality of optical bandpass filters (part of fixed wavelength receivers 61-1...N) coupled, respectively, to each one of the plurality of composite signals, each of the bandpass filters having a center wavelength, the plurality of bandpass filters passing a portion of the optical signal to form a plurality of filtered signals (although Arthurs et al. do not explicitly illustrate the

bandpass filters in Figure 3, they disclose that the receivers 61-1...N may comprise them; see column 5, lines 23-25), the optical-to-electrical converter converting the plurality of filtered optical signals into a plurality of respective electrical output signals (column 4, lines 4-19); and

a control circuit (including control logic 53-N and other circuitry shown in Figure 2) coupled to the plurality of tunable lasers of the electrical-to-optical converter (transmitters 45-1...N),

the control circuit selecting a respective programmed wavelength in response to the plurality of bandpass center wavelengths, the control circuit controlling at least one tunable laser so that the control circuit couples at least a first input signal of the plurality of input signals to at least one of the plurality of respective electrical output signals (column 3, lines 40-43).

Arthurs et al. do not specifically disclose that the bandpass filters in the optical-to-electrical converter have a tunable center wavelength or that the control circuit further controls a tunable center wavelength of a filter corresponding to at least one tunable laser. However, Blackburn et al. teach a related system including transmitting an optical signal having a particular wavelength and using an optical-to-electrical converter comprising a bandpass filter 34 to receive the signal (Figure 2). Blackburn et al. further teach using a tunable bandpass filter instead of a fixed bandpass filter in order to accommodate wavelength shifts caused by temperature changes (column 1, lines 48-68; column 2, lines 1-3; column 3, lines 9-35).

It would have been obvious to a person of ordinary skill in the art to specifically provide tunable filters as taught by Blackburn et al. as the filters already disclosed in the system disclosed by Arthurs et al. in order to allow reception of particular signals under various

temperatures and other conditions that may shift the signal wavelengths and thereby ensure that the transmitted signals are properly received.

Regarding claim 12, Arthurs et al. disclose an optical-to-electrical converters(receivers 61-1...N shown in Figure 3), but do not further specifically disclose that the optical-to-electrical converter comprises a photodiode. However, photodiodes are well known in the art as commonly available devices for converting optical signals to electrical ones. It would have been obvious to a person of ordinary skill in the art to use photodiodes as the optical-to-electrical converter in the system described by Arthurs et al. in view of Blackburn et al. simply in order to implement the disclosed conversion using widely known and available elements.

Regarding claim 13, Arthurs et al. disclose that the mixing circuit comprises a passive star power splitter (element 22 in Figure 3; column 4, lines 4-14).

Regarding claim 22, as similarly discussed above with regard to claim 1, Arthurs et al. disclose a method of operating a routing circuit (Figure 3) comprising:

converting a plurality of electrical signals to a respective plurality of modulated optical signals (using transmitters 45-1...N);

coupling the plurality of modulated optical signals to a cross connect switch (star coupler 22);

forming a plurality of composite signals at a plurality of outputs of the cross-connect switch, the plurality of composite signals composed of the modulated optical signals (using star coupler 22; column 4, lines 4-14);

converting each of the composite signals into an electrical output signal corresponding to a portion of the modulated optical signals (using fixed wavelength receivers 61-1...N; column 4, lines 15-19).

selecting respective programmed wavelengths for a plurality of tunable lasers (transmitters 45-1...N; column 3, lines 54-59); and

controlling (using including control logic 53-N and other circuitry shown in Figure 2) at least one tunable laser so that at least a first input signal of the plurality of input signals is coupled to at least one of the plurality of respective electrical output signals (column 3, lines 40-43).

Arthurs et al. further disclose a plurality of bandpass filters (although Arthurs et al. do not explicitly illustrate the bandpass filters in Figure 3, they disclose that the receivers 61-1...N may comprise them; see column 5, lines 23-25). Arthurs et al. do not specifically disclose selecting programmed wavelengths for a plurality of bandpass center wavelengths for the bandpass filters or controlling the tunable center wavelengths.

However, again, Blackburn et al. teach a related system including transmitting an optical signal having a particular wavelength and using an optical-to-electrical converter comprising a bandpass filter 34 to receive the signal (Figure 2). Blackburn et al. further teach using a tunable bandpass filter instead of a fixed bandpass filter in order to accommodate wavelength shifts caused by temperature changes (column 1, lines 48-68; column 2, lines 1-3; column 3, lines 9-35).

It would have been obvious to a person of ordinary skill in the art to specifically provide tunable filters as taught by Blackburn et al. as the filters already disclosed in the method

disclosed by Arthurs et al. in order to allow reception of particular signals under various temperatures and other conditions that may shift the signal wavelengths and thereby ensure that the transmitted signals are properly received.

Regarding claim 25, Arthurs et al. disclose that converting a plurality of electrical signals to a respective plurality of modulated optical signals comprises modulating a respective plurality of diode lasers, each of which is tuned to the center wavelength of a bandpass filter (column 3, lines 34-43). Again, although Arthurs et al. do not explicitly illustrate the bandpass filters in Figure 3, they disclose that the receivers 61-1...N may comprise them; see column 5, lines 23-25.

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs et al. in view of Blackburn et al. as applied to claim 1 above, and further in view of Kogelnik et al. (US 4,787,693 A).

Regarding claim 7, Arthurs et al. in view of Blackburn et al. describe a system as discussed above with regard to claim 1, including a mixing circuit (also known as a star coupler), but they do not specifically disclose a first plurality of mixers coupled with a second plurality of mixers.

However, Kogelnik et al. teach a mixing circuit/star coupler with characteristics similar to those of the mixing circuit disclosed by Arthurs et al., and Kogelnik et al. further teach a mixing circuit comprising at least a first plurality of mixers cross coupled with a second plurality of mixers (Figures 2, 3, 4, and 6 show various examples of mixing circuits comprising pluralities of smaller mixing circuits cross coupled together; column 2, lines 39-45; column 4, lines 1-5).

It would have been obvious to a person of ordinary skill in the art to include a first plurality of mixers cross coupled with a second plurality of mixers as taught by Kogelnik et al. in the system described by Arthurs et al. in view of Blackburn et al. in order to implement the mixing circuit already disclosed.

4. Claim 9 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs et al. in view of Blackburn et al. as applied to claim 1 above, and further in view of Bailey et al. (US 6,470,036 B1).

Regarding claim 9, Arthurs et al. in view of Blackburn et al. describe a system as discussed above with regard to claim 1, and Arthurs et al. disclose a router circuit as discussed above with regard to claims 1 and 8 above, including tunable lasers 45-1...N, and further disclose that the lasers are coupled to a control circuit (control logic 53-N shown in Figure 2). They do not specifically disclose a temperature sensor.

Bailey et al. teach an implementation of a tunable laser (Figure 2) including a control circuit 65 like the one already disclosed by Arthurs et al., and Bailey et al. further teach a temperature sensor 50 coupled to the laser, wherein the control circuit 50 responds to the sensor (column 5 lines 53-67; column 6 lines 1-10).

It would have been obvious to a person of ordinary skill in the art to further include a temperature sensor as taught by Bailey et al. in the system described by Arthurs et al. in view of Blackburn et al. in order to ensure that the output wavelength of the disclosed tunable laser is stabilized against changes in temperature and thereby increase the reliability of the system

Regarding claim 28, Arthurs et al. disclose that the control circuit controls a wavelength control current to maintain the programmed wavelength (via control line 47 as shown in Figure 2; column 3, lines 40-45).

5. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs et al. in view of Blackburn et al. as applied to claim 1 above, and further in view of Nishihara (US 6,512,616 B1) and Sotom et al. (US 5,896,212 A)

Regarding claims 10 and 11, Arthurs et al. in view of Blackburn et al. describe a system as discussed above with regard to claim 1, including a router circuit, but they do not specifically disclose a clock circuit.

However, Nishihara teaches a system for optical communication including an optical switch 131 (Figure 1). Nishihara further teaches transmitting a clock signal with the data signals using a clock electrical-to-optical converter 103 and a clock optical-to-electrical converter 112' (column 12, lines 3-34), wherein the clock signal is delayed corresponding to an optical path

length of the optical circuitry (i.e., optical switch 131) to match the output data signals. Nishihara do not specifically teach an optical delay line, but

Sotom et al. teach using an optical delay line (in buffer 15 shown in Figure 4) to delay an optical signal so that the signal is provided with a required amount of delay for proper timing and synchronization in relation to other transmitted signals (column 5, lines 8-35). Regarding claim 11 in particular, Sotom et al. teach that the optical delay line comprises an optical fiber having a length corresponding to the required delay so that passive synchronization is achieved at the end of the delay line.

Regarding claims 10 and 11, it would have been obvious to a person of ordinary skill in the art to include transmitting a clock signal with the data signals as taught by Nishihara and transmitting a clock signal through a fiber delay line as further taught by Sotom et al. in the system described by Arthurs et al. in view of Blackburn et al. in order to ensure that the data output from the router maintains synchronization.

6. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs et al. in view of Blackburn et al. as applied to claim 1 above, and further in view of Kintis et al. (US 5,661,582 A).

Regarding claims 14 and 15, Arthurs et al. in view of Blackburn described a router as discussed above with regard to claim 1, and Arthurs et al. further disclose a buffer circuit 43 (shown in Figure 2) synchronizing the electrical input signals within a predetermined tolerance before the router (column 3, lines 16-43).

Arthurs et al. do not specifically disclose that the electrical inputs/signals comprise RF inputs/signals. However, Kintis et al. teach a system related to the one disclosed by Arthurs et al.

including optical switching means (Figures 1-3). They further teach using the optical switching means to process RF inputs from a satellite system that are converted to optical signals (column 2, lines 8-31). It would have been obvious to a person of ordinary skill in the art to incorporate RF signals such as taught by Kintis et al. as the electrical inputs in the system described by Arthurs et al. in view of Blackburn et al. in order to advantageously allow the RF signals to be switched in the optical domain instead of the electrical domain. Kintis et al. particularly teach that signals suffer losses in an electrical switching system and that it would especially disadvantageous for RF signals from satellites to have high losses since the price of amplifying in a satellite is high (column 1, lines 42-60).

7. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs et al. in view of Blackburn et al. as applied to claim 22 above, and further in view of Nishihara.

Regarding claims 23 and 24, Arthurs et al. in view of Blackburn et al. describe a method of operating a router circuit as discussed above with regard to claim 22, but they do not specifically disclose a clock signal.

However, Nishihara teaches a method for optical communication including an optical switch 131 (Figure 1). Nishihara further teaches synchronizing the output data signals with a clock signal (Abstract). Regarding claim 24 in particular, Nishihara teaches delaying the clock signal to an amount corresponding to a delay of a cross-connect switch 131 to obtain a delayed clock signal (column 12, lines 3-34).

It would have been obvious to a person of ordinary skill in the art to include transmitting a delayed clock signal with the data signals as taught by Nishihara in the method described by

Arthurs et al. in view of Blackburn et al. in order to ensure that the data output from the router maintains synchronization.

8. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arthurs et al. in view of Blackburn et al. as applied to claims 1 and 25 respectively above, and further in view of Tada et al. ("Design Consideration on a DBR-Laser Transmitter for Fast Frequency-Switching in an Optical FDM Cross-Connect System," Journal of Lightwave Technology, vol. 11, no. 5/6, May-Jun 1993, pp. 813-818,).

Regarding claims 26 and 27, Arthurs et al. in view of Blackburn et al. describe a system and method as discussed above with regard to claims 1 and 25, and Arthurs et al. disclose a plurality of tunable laser diodes (column 3, lines 54-59). Arthurs et al. do not specifically disclose that each tunable diode laser comprises a pair of diode lasers. However, Tada et al. teach a related optical communications system including a plurality of transmitters comprising tunable lasers (Figure 1). Tada et al. further teach that each transmitter comprises a pair of diode lasers (Figure 8), each having a wavelength switching time longer than a desired wavelength switching time so that while a first of the pair is operating at a first wavelength, a second of the pair is tuning to a second wavelength for use after a next switching event (pages 816-817, "V. Duplex Transmitter System Configuration"). It would have been obvious to a person of ordinary skill in the art to use a pair of diode lasers for each of the tunable lasers as taught by Tada et al. in the system and method described by Arthurs et al. in view of Blackburn et al. in order to achieve faster wavelength tuning without losing transmitted data.

Response to Arguments

9. Applicants' arguments with respect to independent claims 1 and 22 have been considered but are moot in view of the new ground(s) of rejection. Examiner notes that although Applicants have amended claim 1 to include many features that were previously recited in claims 2-6 and 8, claim 1 currently recites a new combination of elements that was not included in any particular previous dependent claim.

Furthermore, in response to Applicants' argument that the references fail to show certain features of Applicants' invention, it is noted that the features upon which applicant relies (i.e., "the control circuit of the present application provides advantageous properties that any input data signal can be coupled to one or more output data signals, and one or more input data signals can be coupled to a single output data signal" as discussed by Applicants on page 5 of their response) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Examiner respectfully notes that claim 1, for example, currently only recites that "the control circuit couples at least a first input signal of the plurality of input signals to at least one of the plurality of respective electrical output signals"; in other words, the control circuit recited may couple one input to one output.

Regarding claims 14 and 15 in particular, in response to Applicants' assertion on page 15 of their response that Kintis et al. do not teach a control circuit as recited, Examiner notes that Kintis et al. reference is primarily relied upon to provide teachings regarding a satellite system including RF inputs whereby the RF inputs may be optically switched for advantageous reasons. The rejections of claims 14 and 15 rely on Arthurs et al. in view of Blackburn et al. to provide

the disclosure/teaching of a control circuit with details as recited in claim 1 (on which claims 14 and 15 depend).

Regarding claim 24 in particular, Examiner respectfully disagrees with Applicants' assertion on page 7 of their response that Nishimura does not teach the recited step of delaying a clock signal. On the contrary, Nishihara teaches delaying the clock signal to an amount corresponding to a delay of a cross-connect switch 131 by propagating it through an optical path having an optical length corresponding to the required delay to obtain a delayed clock signal (column 12, lines 3-34).

Conclusion

10. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicants are reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Y. Leung whose telephone number is 571-272-3023. The examiner can normally be reached on Monday to Friday, 6:30 to 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571-272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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